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A NEW ISIDID OCTOCORAL (ANTHOZOA: GORGONACEA) FROM NEW CALEDONIA, WITH DESCRIPTIONS OF OTHER NEW SPECIES FROM ELSEWHERE IN THE PACIFIC OCEAN

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Abstract.—The status of the genera *Isidella, Acanella,* and *Lepidisis* in the subfamily Keratoisidinae is discussed and the new species *Isidella trichotoma* and *Acanella dispar* are described and illustrated. New records of *Acanella sibogae* Nutting are presented and description of the species amplified and supported by new illustrations of colony, polyps and sclerites. *Orstomisis crosnieri,* a new genus and species of Keratoisidinae, is described and illustrated. A new key to genera of Isidinae and Keratoisidinae is presented.

Among the gorgonians from New Caledonia obtained by M. Georges Bargibant of ORSTOM, Nouméa, is a large isidid colony superficially resembling a robust *Keratoisis* but branched dichotomously from the nodes rather than laterally from the internodes. The characters usually considered "diagnostic" agree with those attributed to *Isidella,* but its growth form and other features are so divergent that assignment of the specimen to that genus must be considered questionable.

The first specimen of this species was received after a manuscript describing New Caledonian Isididae (Bayer & Stefani 1987a) had been submitted for publication. A description of it was prepared for inclusion in another paper on Isididae (Bayer & Stefani 1987b) but was withdrawn when six more specimens were discovered among numerous isidids in a rich collection of deep-water gorgonians from New Caledonian waters received from the Muséum National d'Histoire Naturelle, Paris. As it is now clear that lack of research funding precludes further study of that collection, the unpublished original description has been revised for publication with supplemental data from the additional specimens and comparative investigation of species of Isididae from elsewhere in the Pacific.

In order to ascertain a taxonomically justifiable position in the family Isididae for this unusual species, it was necessary to survey all the genera of the subfamily Keratoisidinae. These are: *Keratoisis* Wright, 1869; *Isidella* Gray, 1858; *Acanella* Gray in Wright, 1869; *Lepidisis* Verrill, 1883; and, possibly, *Tenuisis* Bayer & Stefani, 1987; the subfamilial affinities of *Australisis* Bayer & Stefani, 1987, remain to be determined and may not lie with the Keratoisidinae. The genera *Keratoisis* and *Tenuisis,* all species of which branch from the internodes, need no further consideration in the present context.

The genus *Isidella* Gray, represented by two nominal species in the North Atlantic and the Mediterranean Sea, shares many morphological features with other genera of the subfamily Keratoisidinae, including *Acanella* Gray, *Lepidisis* Verrill and *Keratoisis* Wright. *Keratoisis* differs by branching from the calcareous internodes, and *Lepidisis* by its unbranched, whiplike, often spiral growth form. *Acanella* differs from *Isidella* chiefly by its bushy colonial form that results from branching in whorls of 3–6 from the horny

nodes. Both species of *Isidella* are characterized by flattened, openly flabellate growth form produced by sparse, distant, dichotomous branching from the horny nodes mostly in one plane.

Muzik (1978:737) refers all species of Keratoisidinae branched from the organic nodes to the genus *Isidella* Gray, 1858, thus synonymizing *Acanella* Gray, 1869, and incorporating the branched *Lepidisis longiflora* Verrill, 1883. This treatment is consistent with the comment made by Verrill (1883:18) that *Lepidisis* differs from *Acanella* "only in having the external layer of small scale-like spicula, both in the coenenchyma and on the calicles," as the development of the superficial layer of small scales is inconsistent. Deichmann (1936:242), in commenting about Verrill's type specimen of *L. longiflora,* does not even mention scales, reporting only "a large number of flat, short, blunt rods, especially in the tentacles," but does describe (p. 241) "small, flattened, narrow rods or scales with rounded ends" in both coenenchyme and polyps of *Lepidisis caryophyllia* Verrill, the unbranched type species. Therefore, it seems quite certain that Verrill's "scales" are the small, flat rods observed in the present material.

The polyps of all species of Keratoisidinae have large spindles and/or rods in the body wall, often conspicuously projecting between the bases of the tentacles, and small, more or less flattened and sometimes thorny rods and/or double stars in the pharyngeal walls. In some species of *Keratoisis* there is a superficial layer of small, flattened, scale-like rods in the polyps and coenenchyme, so this character does not reliably distinguish *Lepidisis* from *Keratoisis.*

The quality of retractability of the polyps has long been used as a primary character distinguishing the subfamily Isidinae from the Keratoisidinae and Mopseinae (Studer [& Wright] 1887; Kükenthal 1915, 1919, 1924; Bayer 1956). The polyps of *Keratoisis, Acanella, Isidella,* and *Lepidisis* (Keratoisidinae) form permanently protruding, often prominent, columnar or conical verrucae incapable of retraction into the thin intervening coenenchyme. Although the polyps of *Isis hippuris* can be completely retracted within the thick coenenchyme, leaving only minute pores in the coenenchymal surface, this is accomplished by folding the virtually sclerite-free tentacles inward over the mouth and closing the coenenchymal aperture over them. The polyps of *Chelidonisis,* the other genus comprising the Isidinae (sensu Kükenthal), cannot retract because the coenenchyme is very thin; the body wall, stiffened by numerous sclerites, forms a permanently projecting verruca. In contraction, the tentacles fold inward over the mouth, closing the verrucal aperture with the sclerite-filled bases of the tentacles (see Bayer & Stefani 1987b: fig. 30). In Kükenthal's system, both are treated as retractile, comprising the subfamily Isidinae.

The polyps of *Muricellisis* Kükenthal also are retractile, but are armed with sclerites arranged as a transverse crown (=collaret) and points (=operculum), hence "retractile" in the more restricted sense of withdrawal of anthocodia within anthostele (Bayer et al. 1983:11; Verseveldt & Bayer 1988:8). Because of this difference, Kükenthal (1915) proposed a separate subfamily Muricellisidinae to accommodate this one genus.

When the character of "retractility" is considered in light of the morphology of *Isis, Chelidonisis, Muricellisis,* and *Keratoisis* (+*Acanella, Isidella, Lepidisis*), it is clear that the subfamily Isidinae as so defined is artificial. However, the genera *Isis* and *Chelidonisis* share a different character that sets them apart from all other isidids and may, indeed, justify the subfamily Isidinae. Those two genera alone in the family have sclerites of basically radiate capstan form, with tubercular sculpture. In *Isis* they are 8-radiates, some larger at one end, form-

ing clubs, some elongated to form spindles that may be coarse and pebble-like; in *Chelidonisis* they are typical 6-radiates.

At the risk of redundance in dealing with isidid classification, a revised subdivision of the family is proposed as follows:

Key to the Genera of Isidinae and Keratoisidinae

1(4). Sclerites in the form of 6- and 8-radiates, clubs, and tuberculate spindles ..... ISIDINAE
2(3). Coenenchyme thick, polyps not projecting ..... *Isis* Linnaeus
3(2). Coenenchyme thin, polyps projecting as conical verrucae ..... *Chelidonisis* Studer
4(13). Sclerites in the form of more or less prickly rods or spindles ..... KERATOISIDINAE
5(6). Colonies unbranched .... *Lepidisis* Verrill
6(5). Colonies branched
7(8). Branches originate on internodes ..... *Keratoisis* Wright
8(7). Branches originate on nodes
9(10). Polyps forming short, cylindrical verrucae into which tentacles and oral part can be fully retracted; branching dichotomous, internodes short (up to 2 cm but mostly 1 cm or less); colonies multiplanar, flabellate, compressed, trunk forming a massive calcified holdfast ..... *Orstomisis,* new genus
10(9). Polyps forming cylindrical, conical or trumpet-shape verrucae, tentacles folding over the mouth but not retractile
11(12). Branching dichotomous, trichotomous, or lateral, predominantly planar, internodes hollow, long or very long (3.5–8 cm) ..... *Isidella* Gray
12(11). Branching verticillate, at least in upper parts, colonies densely or openly bushy, internodes solid, shorter, up to 2 cm ... . *Acanella* Gray
13(4). Sclerites in the form of flat plates, sometimes elongate and spindle-like but never with complex tubercular sculpture .... MOPSEINAE. (See Bayer & Stefani, 1987a:51; 1987b: 941.)

Isidella Gray, 1858

Isidella Gray, 1858:283; 1870:14.—Studer [& Wright], 1887:44.—Kükenthal, 1915: 118; 1919:564; 1924:414.—Deichmann, 1936:239.—Bayer, 1956:F222; 1981:941 (in key).—Carpine & Grasshoff, 1975: 107.—Bayer & Stefani, 1987a:51 (in key); 1987b:941 (in key).
Isis.—G. von Koch, 1887:90.

Diagnosis.—Isididae sparsely branched dichotomously or trichotomously from the nodes, usually in one plane, forming spindly colonies often of candelabrum form; internodes long (up to 8 cm), hollow, longitudinally grooved, straight or nearly so; base of main stem forming a lobed, rootlike calcareous holdfast anchored in soft substrate. Polyps non-retractile, cylindrical, armed with stout, faintly prickly needles and/or rods longitudinally placed in body wall; wall of pharynx with abundant small prickly rods.

Type species.—*Isis elongata* Esper (by monotypy).

Remarks.—Gray's original (1858) and subsequent (1870) descriptions of *Isidella* do not provide sufficient detail for adequately defining the genus. Verrill (1883:13) considered the genus doubtful, but Studer [& Wright] (1887:44) accepted it on the basis of Koch's (1887) account of *Isis neapolitana* Koch (=*Isidella elongata* [Esper]) and defined it essentially as diagnosed above. Koch (1887), Verrill (1883), Studer [& Wright] (1887), Nutting (1910), and Bayer

(1956) maintained that the large rods or spindles of the polyps do not project between the bases of the tentacles as they do in *Acanella,* but Kükenthal (1924) stated that the large septally placed spindles can "ein klein wenig zwischen den Tentakeln vorragen," and Carpine & Grasshoff (1975: 108, 109, fig. 59) showed that the spindles may project conspicuously (even though this fact contradicted the generic characteristics stated on page 107).

Three lots of *I. elongata,* among them one from the Zoological Station at Naples, the authenticity of which can hardly be doubted, clearly show the distinctly projecting spindles described and illustrated by Carpine & Grasshoff. A fourth, received from Prof. C. C. Nutting without locality (but possibly from the Zoological Station at Naples, as the polyps were skilfully relaxed before fixation), shows strong, septally placed spindles that do not project between the tentacles—because the tentacles are fixed in more or less extended attitudes. It is difficult to reconcile these observations with Koch's careful illustrations (1887:text-fig. 51; pl. 5, fig. 8), which show polyps of *I. elongata* without such strong needles, so the identity of "*Isis elongata*" seems open to question. Nevertheless, the salient generic features of the genus, i.e., dichotomous branching from the horny nodes, more or less in one plane, with prominent, non-retractile polyps armed with rods and needles, are sufficiently distinctive that validity of the genus *Isidella* is not in question.

Distribution.—Heretofore, the genus *Isidella* has been reported only from the Mediterranean and eastern Atlantic.

Isidella trichotoma, new species
Figs. 1a, 2–4

Material.—Southeast of Hawaii: 18°33.1'N, 155°26.1'W, 6300 feet (=1920 m), coll. J. G. Moore, serial 1723b, 17 Oct 1962. One colony much broken and lacking holdfast, alcohol, USNM 56715 (holotype).

Diagnosis.—*Isidella* with dichotomous and trichotomous branching, internodes long (to 8 cm), hollow, nearly straight. Polyps uniserially placed at wide intervals, cylindrical, short, armed with longitudinally placed needles the largest of which may project slightly between bases of tentacles; pharyngeal walls with small, flat rodlets.

Description.—The colony (Fig. 1a) is sparingly branched from the nodes, trichotomous and dichotomous, the internodes snow white, smooth, not longitudinally ribbed, hollow, nearly straight, long, the longest intact internode 8 cm long and 1.15 mm in diameter about mid-length; an internode broken at one end is 8.5 cm long and only 0.8 mm in diameter. The stoutest internode is 2 mm in diameter. The nodes of the largest branches are about 2 mm long, brown, those of the thinner branches 1 mm or less, yellowish brown.

The polyps (Fig. 2) are uniserially placed, mostly about 8 mm apart, occasionally as close as 5 mm and as far as 10 mm. They stand vertically or obliquely slanted toward the branch tips, cylindrical, mostly about 4–5 mm tall with tentacles folded over the mouth, but a few smaller individuals occur in the spaces between larger ones, indicating that new polyps do not arise exclusively at the branch tips; they are about 3 mm in diameter at mid-height, widening toward the base and sloping into the coenenchyme. Slender, nearly smooth pointed needles (Fig. 3a) about 1.5 mm long are longitudinally arranged in groups of 2 or 3 along the mesenterial insertions, projecting little if at all between the tentacle bases; smaller needles are scattered among and between the mesenterial groups, mostly lying deep in the thick, translucent mesogloea of the polyp body. Converging groups of still smaller needles lie in the bases of the tentacles, becoming more or less longitudinal along the rachis; clusters of small, flat, blunt rods (Fig. 3d) lie longitudinally in the pinnules. The pharyngeal wall contains scattered small, flattened rodlets, with a median waist and

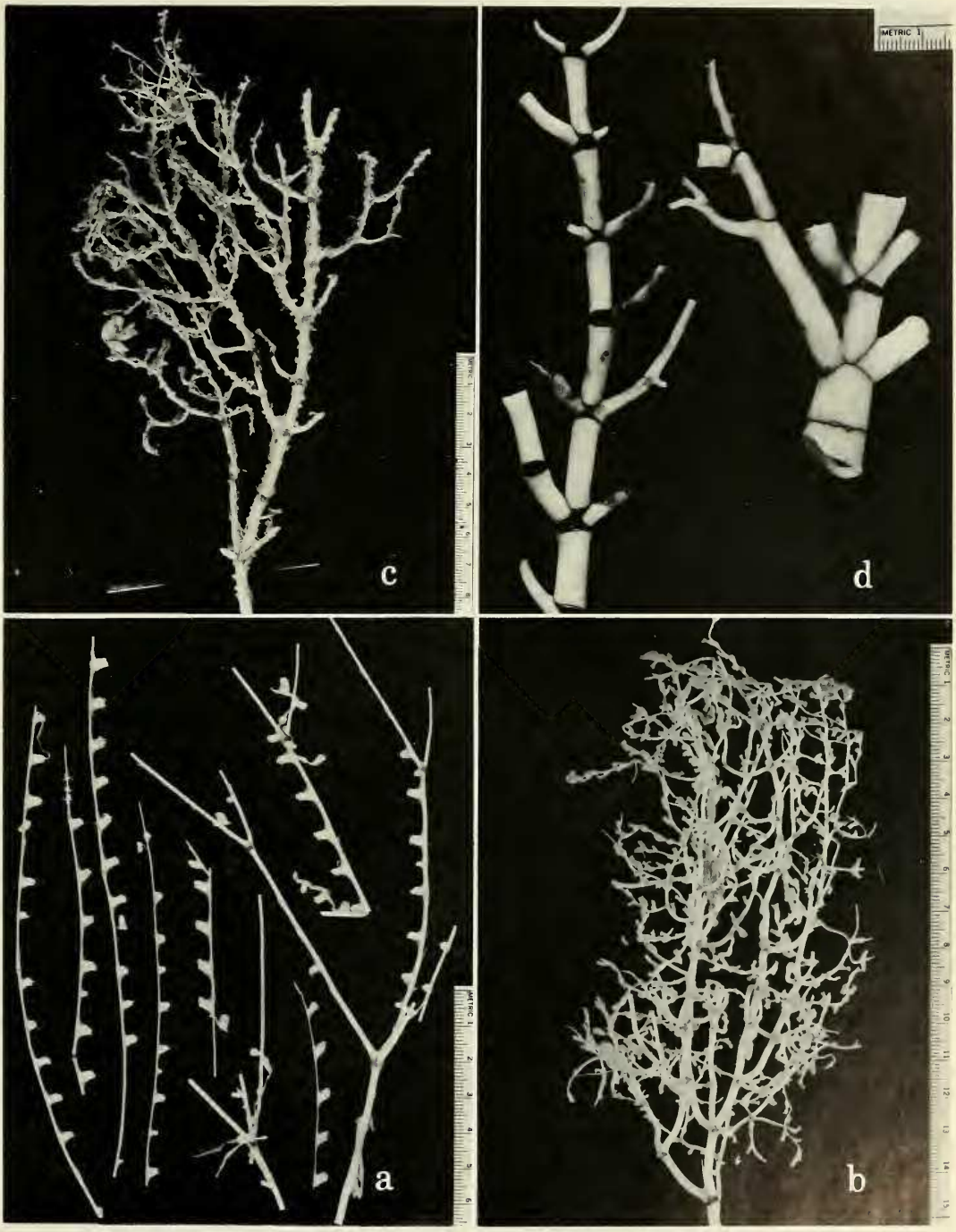


Fig. 1. a, *Isidella trichotoma* USNM 56715: branches. b, *Acanella sibogae* USNM 49969, colony. c, *Acanella dispar* USNM 56816: distal branches. d, *A. dispar* USNM 56816: axis.

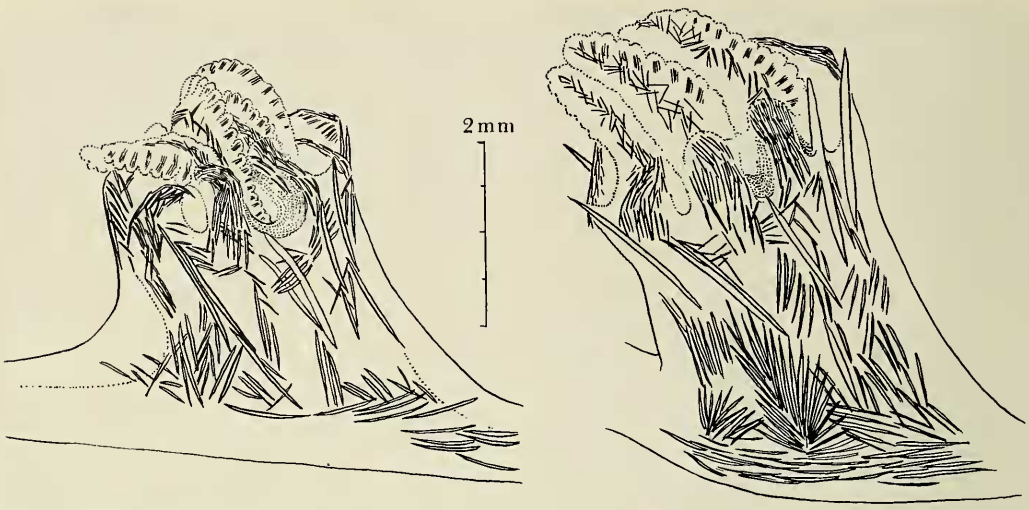


Fig. 2. *Isidella trichotoma* USNM 56715: polyps.

tapered to blunt ends, mostly 0.11 mm in length, with a few straight-sided flat rods up to 0.15 mm in length (Fig. 3d).

The extremely thin coenenchyme contains slender, delicate needles (Fig. 3b, c) up to 4 mm in length and 0.05 mm in diameter lying longitudinally along the axis. They are straight or slightly curved, not entirely uniform in diameter, and ornamented with scattered, low granules. There is clear evidence that their length is achieved by fusion of adjacent sclerites (Figs. 3c, 4).

The nature of the holdfast is unknown but, considering the shape of the colony and the depth of the habitat, it most likely was a lobate, rootlike structure similar to that of other species of *Isidella*.

Etymology.—From Greek *tricha* = in three parts + *tomos* = a cutting, in allusion to the manner of branching.

Remarks.—Even though the branching of this species is trichotomous in some cases and thus not uniplanar, it is not verticillate in the manner of *Acanella*. The very long, slender, nearly straight, hollow internodes and widely separated ramifications result in a spindly, openly branched colony of gross aspect closer to *Isidella* than to *Acanella* with its short, solid, more or less conspicuously curved internodes.

Acanella Gray, 1870

Acanella Gray, 1870:16.—Studer [& Wright], 1887:44.—Nutting, 1910:14.—Kükenthal, 1919:573; 1924:414.—Deichmann, 1936:243.—Bayer, 1956:F222; 1981:941 (in key).—Bayer & Stefani, 1987a:51 (in key); 1987b:941 (in key).

Isidella.—Muzik, 1978:737 (part).

Diagnosis.—Keratoisidinae branched in whorls from nodes, at least in upper parts of colonies, forming bush-like colonies of moderate size (rarely more than 20 cm) when anchored in soft substrate by lobate holdfast, larger and compressed (possibly to 1 m in height) when attached to hard bottom; internodes solid, short (to 2 cm). Polyps nonretractile, cylindrical, armed with sparsely prickly needles and/or rods longitudinally or obliquely placed in body wall; pharyngeal wall with small thorny stars or short rods.

Remarks.—The consolidation of *Isidella* and *Acanella* as a single genus of Keratoisidinae with branching originating at the nodes, as proposed by Muzik (1978) has practical advantages. However, the verticillate branching of *Acanella* is so distinctive that it seems preferable to retain it pending a thorough review of all species involved.

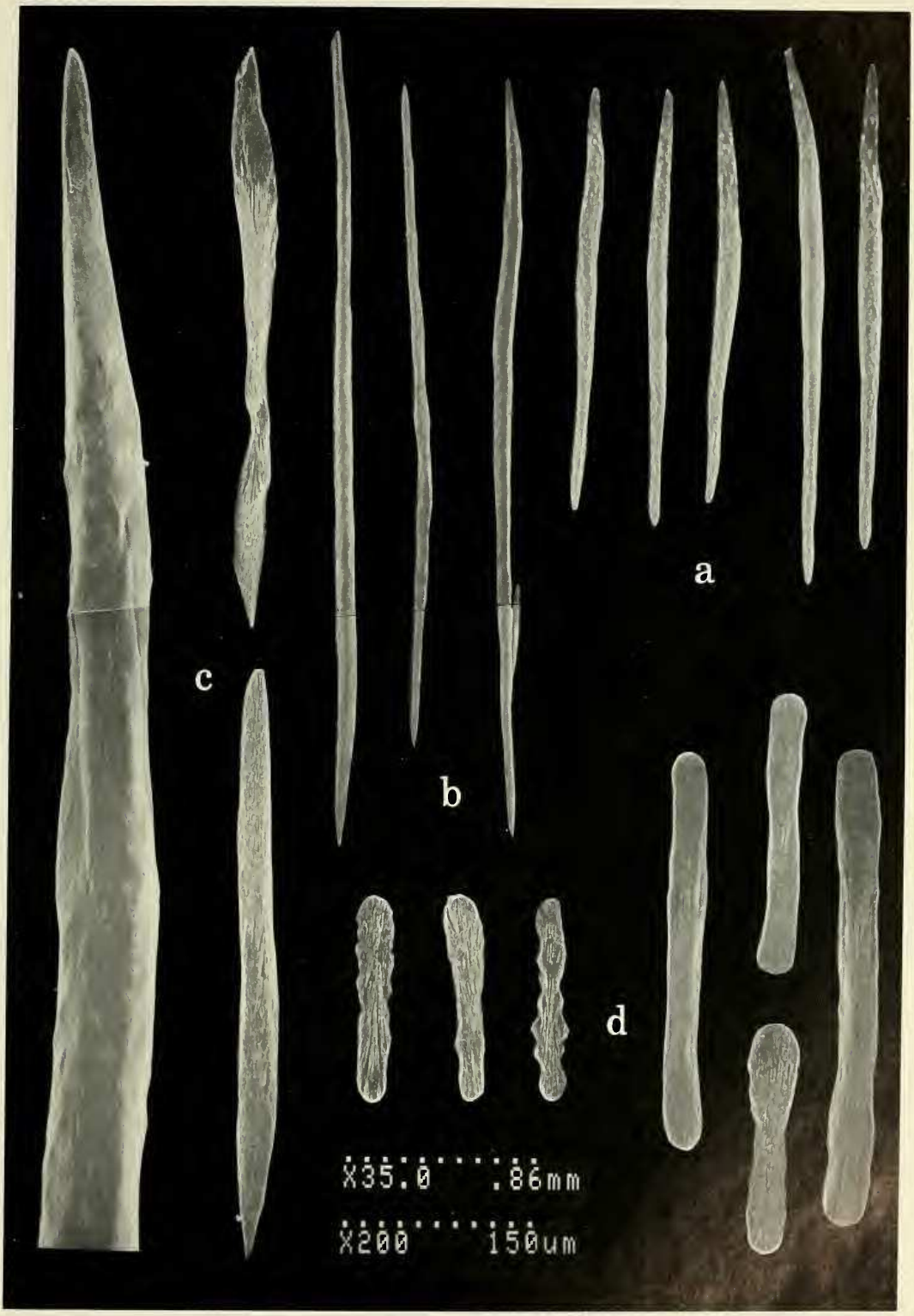


Fig. 3. *Isidella trichotoma* USNM 56715, sclerites: a, Body wall. b, c, Coenenchyme. d, Tentacles, pinnules, and pharynx. a, b, 0.86 μm scale; c–d, 150 μm scale.

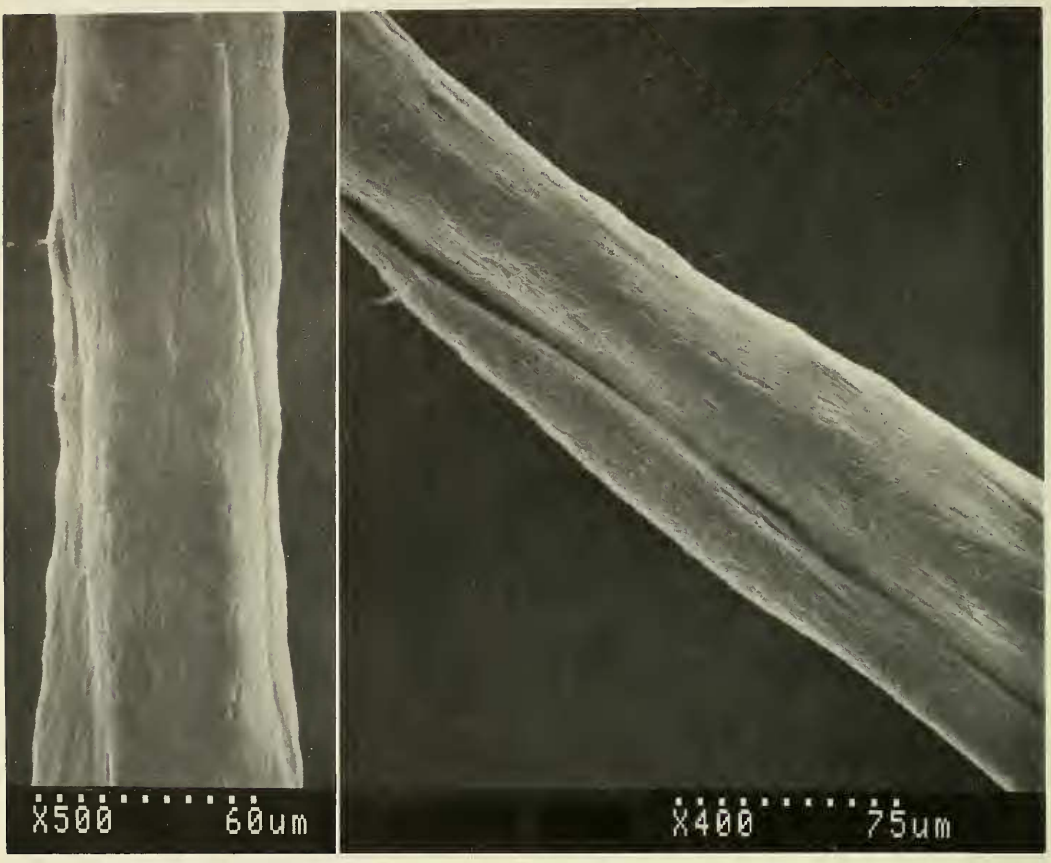


Fig. 4. *Isidella trichotoma* USNM 56715: Large coenenchymal needle produced by fusion of smaller sclerites.

Acanella sibogae Nutting, 1910
Figs. 1b, 5

?*Acanella rigida* Wright & Studer, 1889:31, pl. 9, fig. 4.—Thomson & Henderson, 1906:33.

?*Acanella robusta* Thomson & Henderson, 1906:33.

Acanella sibogae Nutting, 1910:14, pl. 3, fig. 2, 2a, pl. 5, fig. 4.—Kükenthal, 1919:575; 1924:419.

?*Acanella japonica* Kükenthal, 1915:120; 1919:582, pl. 44, fig. 76.

Material.—Japan, off Mizimoko-shima Light: 32°36′N, 132°23′E, 437 fathoms (=799 m), bottom greenish brown mud, fine grey sand and foraminifers, USFC steamer *Albatross* sta. D-4957, 23 Aug 1906. One large colony with holdfast, alcohol, USNM 49792.

Japan: off Shio Misaki Light: 33°25′20″N, 135°36′20″E, 244–290 fathoms (=446–530 m), bottom brown mud, sand and foraminifers, USFC steamer *Albatross* sta. D-4966, 29 Aug 1906. Two damaged colonies with holdfasts, alcohol, USNM 49619.

Japan: off Shio Misaki Light: 33°23′40″N, 135°33′E, 587 fathoms (=1074 m), bottom brown mud, sand and stones, USFC steamer *Albatross* sta. D-4969, 27 Aug 1906. Damaged branch, in alcohol, USNM 49468.

Japan: off Shio Misaki Light: 33°23′30″N, 135°34′E, 649 fathoms (=1187 m), bottom brownish green mud and foraminifers,

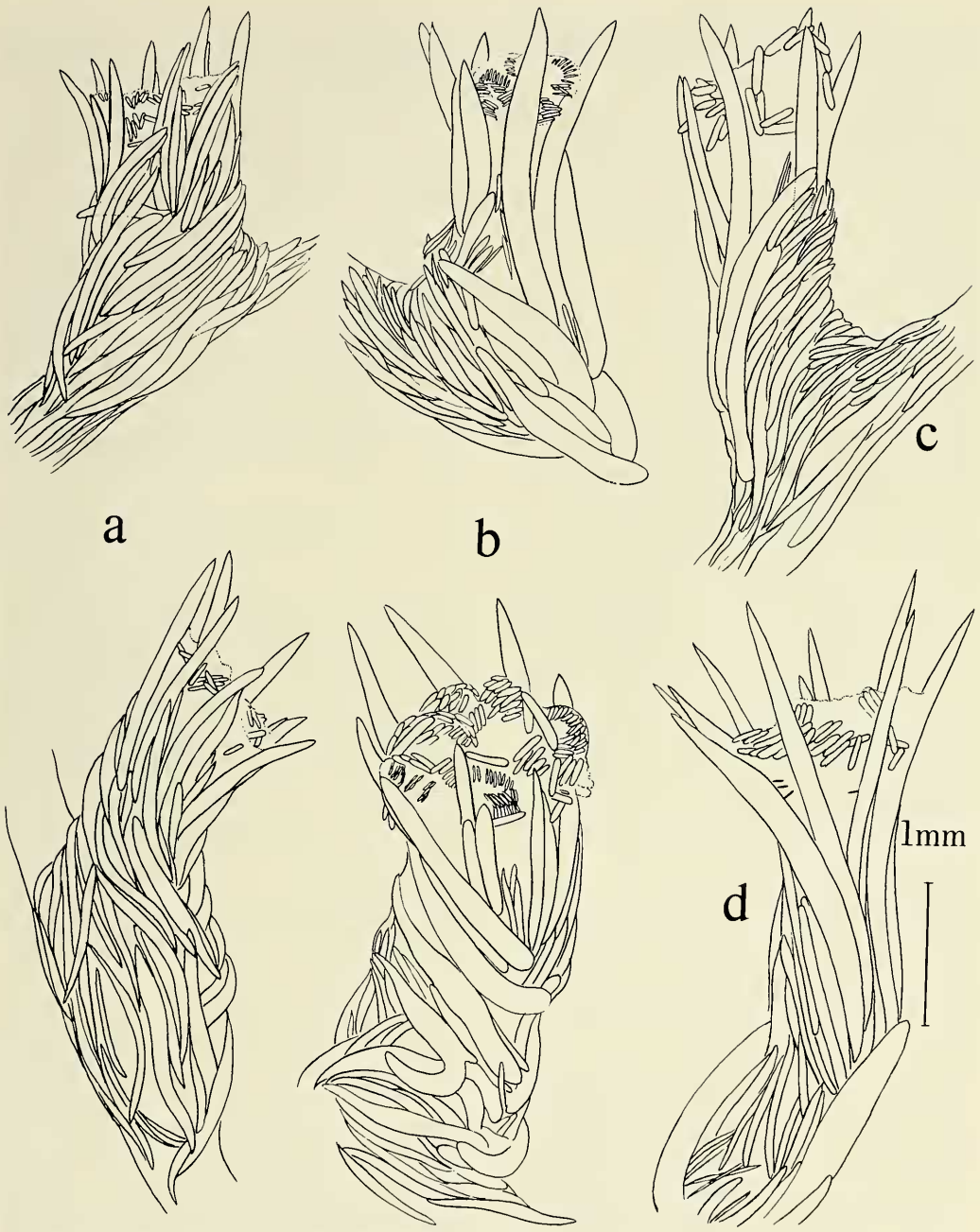


Fig. 5. *Acanella sibogae,* polyps: a, USNM 49917. b, 49969. c, 49619. d, 49468.

USFC steamer *Albatross* sta. D-4971, 30 Aug 1906. Two colonies, one with holdfast, in alcohol, USNM 49466.

Philippines: east coast of Luzon, off Batag I.: 12°44′42″N, 124°59′50″E, 383 fathoms (=700 m), green mud and sand, USFC steamer *Albatross* sta. D-5445, 3 Jun 1909. One colony with holdfast, in alcohol, USNM 50156.

Philippines: off Balicasag I. between Siquijor and Bohol Is.: 9°22′30″N, 123°42′40″E, 392 fathoms (=717 m), bottom globigerina ooze, USFC steamer *Albatross* sta. D-5527, 11 Aug 1909. Seven specimens more or less complete with holdfast, 3 lacking holdfast, and several fragmentary colonies, in alcohol, USNM 49917.

Molucca Passage, off Mareh I.: 0°37′00″N, 127°15′00″E, 417 fathoms (=763 m), bottom grey mud, USFC steamer *Albatross* sta. D-5618, 27 Nov 1909. Two colonies with holdfast, one nearly complete, alcohol, USNM 49896; 2 colonies, one with holdfast, alcohol, USNM 50147.

Buton Strait, off North I.: 5°35′00″S, 122°20′00″E, 559 fathoms (=1022 m), bottom green mud, USFC steamer *Albatross* sta. D-5648, 16 Dec 1909. Two colonies, alcohol, USNM 49969.

Indonesia: Flores Sea: 5°36′30″S, 120°49′00″E, 692 fathoms (=1266 m), grey mud and sand, bottom temperature 39.2°F, USFC steamer *Albatross* sta. D-5660, 20 Dec 1909. One verticillate branch, in alcohol, USNM 49959.

Diagnosis.—*Acanella* with tall, vertically or obliquely placed polyps armed with several very large spindles longitudinally or diagonally placed in the body wall, and projecting conspicuously as 8 strong points around the folded tentacles. Holdfast a lobed, rootlike structure; secondary branching commonly in whorls of 2.

Remarks.—Several colonies taken by the USFC steamer *Albatross* agree in all essential features with the original description of an incomplete colony obtained by the *Siboga* Expedition north of Ceram (2°40′S, 128°37.5′E, 835 m) (Nutting 1910:14) and provide data to supplement the description of the species.

One fully developed colony from Buton Strait southeast of Celebes (USNM 49969), lacking its basal holdfast, is about 15 cm tall (Fig. 1b); an immature specimen from the same station is 6 cm tall including the rootlike holdfast. Other specimens from Japan (USNM 49466, 48468, 49619, 49792), the Philippines (USNM 49917, 50156), Flores Sea (USNM 49959), and Molucca Strait (USNM 50147) are in close agreement in colonial form, and size and armature of polyps.

The type specimen (Nutting 1910:pl. 3, fig. 2, 2a), evidently a branch from a larger colony, branched in pairs from the nodes but two pairs showed evidence of a third branch. Whereas the present specimens show a tendency to branch in pairs (i.e., "whorls" of 2), whorls of 3 and 4 are common and some nodes produce as many as 6 branches in a whorl. The internodes are solid, white, smooth but weakly ribbed longitudinally, those of the principal branches 13–17 mm long, of the small side branches about 10 mm. The nodes are reddish brown, short, 1.5 mm to less than 1 mm in length. A few anastomoses between branches are present, as well as branchlets originating from internodes.

Although Nutting (1910:15) described the polyps as mostly columnar and vertically placed on the branches, his photographs of the type branch and a twig with 3 polyps clearly show that they tend to slant distad toward the twig tips. The same condition prevails in the present specimens, on which vertically placed polyps certainly occur, but oblique ones predominate.

The polyps (Fig. 5) generally conform in size with the dimensions given by Nutting, and show the "crown of eight well-marked points around the margin, each point consisting of the distal end of a single spicule"

(Nutting 1910:15). Several large, more or less obliquely placed, curved spindles about 3 mm long surround the body of the polyps, projecting between the bases of the tentacles to produce the crown.

Comparisons.—The polyps of *Acanella verticillata* Kükenthal, 1915, from off Siberut Island have strongly projecting marginal spines but are smaller (2 mm tall) than in the *Siboga* specimen and those reported here (4–5 mm). Moreover, according to Kükenthal's description and illustration (1919: 584, fig. 258), a layer of obliquely placed, curved spindles covers the proximal part of the vertically placed projecting spindles. The large number of branches in the whorls described for *verticillata* is present, if not common, also in some of the specimens of *sibogae* now reported.

Without a reexamination of type material, it is impossible to determine with certainty whether or not *Acanella rigida* Wright & Studer from off Banda, *A. robusta* Thomson & Henderson, 1906, from the Andaman Islands, and *A. verticillata* Kükenthal, 1915, from off Siberut Island west of Sumatra are identical with *sibogae,* but all characters mentioned in the original descriptions are consistent with that interpretation.

Distribution.—Japan south and west to the Philippines and Indonesia, 446–1266 m.

Acanella dispar, new species
Figs. 1c, d, 6–8

?*Lepidisis longiflora.*—Nutting, 1908:572. Not *Lepidisis longiflora* Verrill, 1883:19.

Material.—Hawaiian Islands, off Makapuu: 21°18′N, 157°32′W, 1200 feet (=366 m), *Star II* submersible, dive 2, 1 Feb 1978, K. Muzik, coll. One large colony now much broken, of which 3 branches are preserved in alcohol, the main trunk and large branches as well as the greater part of the secondary branches dry, USNM 56816, holotype.

Hawaiian Islands, off Kaena Point: 21°35.85′N, 158°24.55′W, 275–445 m, "Sango XII" Haul 1, 27 Jul 1971, R. Grigg, coll. Damaged branches, identification uncertain, USNM 56719.

Hawaiian Islands, off French Frigate Shoal: 23°53.1′N, 165°31.9′W, 326–363 m, "Sango XIV" Haul 2, 27 Aug 1971, R. Grigg, coll. Damaged branches, identification uncertain, USNM 56726.

Hawaiian Islands, off NW coast of Oahu: Kahuku Point N. 79°, E. 10.1′, 216–251 fathoms (=395–459 m), USFC steamer *Albatross* sta. D-4121, 25 Jul 1902. Fragments, identification uncertain; reported as *Lepidisis longiflora* by Nutting (1908), USNM 25358.

Diagnosis.—*Acanella* with principal branching commonly in whorls of 2, roughly planar, secondary branching in whorls of 3 or more, bushy. Polyps with longitudinally placed needles of body wall developed asymmetrically, those of abaxial side stronger and more or less projecting between bases of tentacles; pharyngeal walls with thorny stars.

Description.—The intact colony was large, probably 1 m or more in height, in the shape of a profusely branched, strongly compressed bush. Branching arises from the nodes predominantly in one plane, singly and in opposite pairs, i.e., whorls of 2; branching becomes verticillate at several places in the colony resulting in branches of typical *Acanella* aspect; here the nodes may give rise to 3 or more branchlets as well as 1 or 2, and in some places are abnormally overgrown by internodal material, possibly induced by the presence of a small actinian.

The internodes of the principal branches are solid, cylindrical, slightly expanded at each end, weakly ribbed longitudinally, 15–20 mm long and up to 15 mm in diameter; all the subordinate branches bend upward so their proximal internodes are slightly curved. The distalmost internodes, straight or nearly so, are up to 20 mm in length but only 0.5–0.7 mm in diameter. The holdfast proper is not preserved, but the proximal

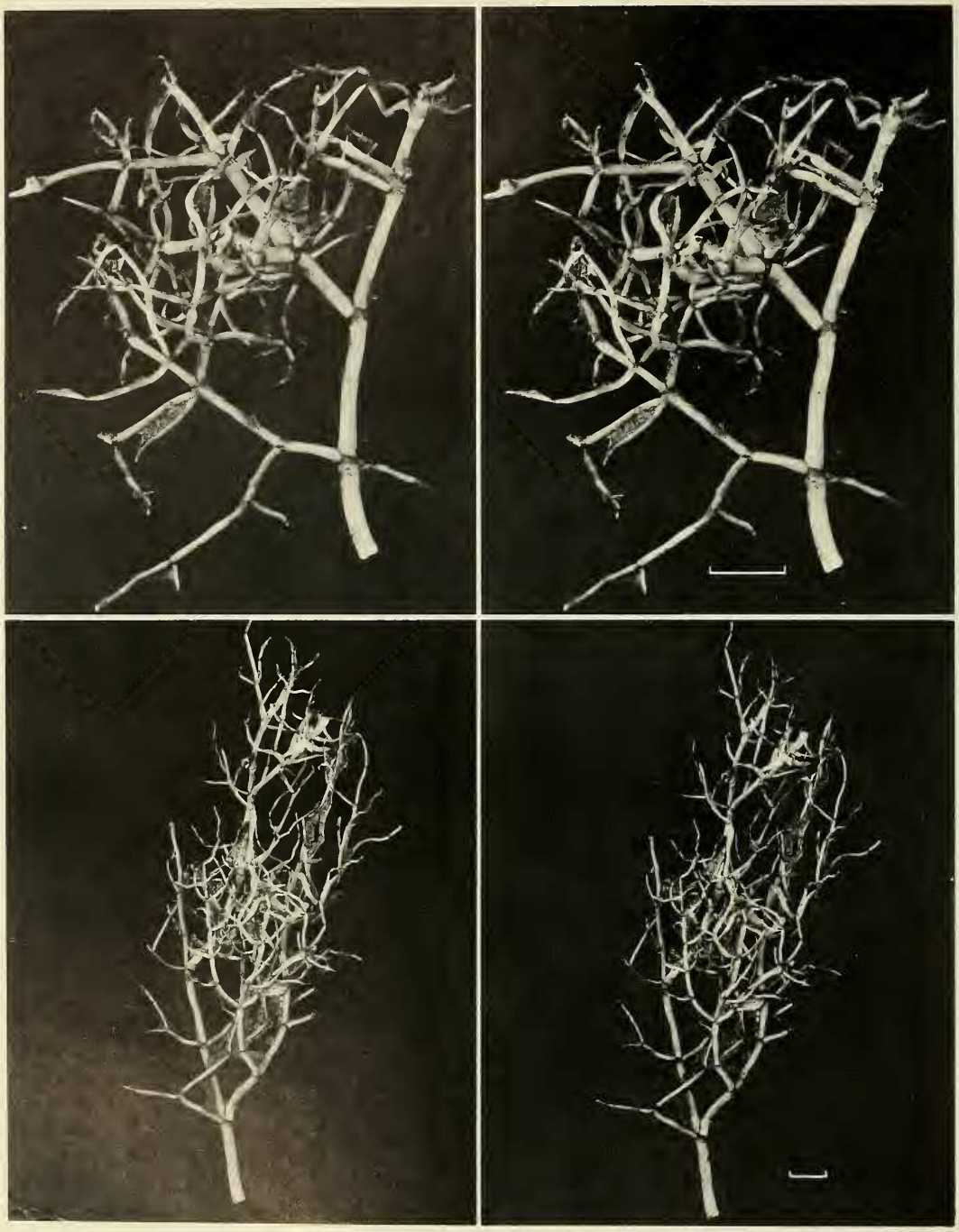


Fig. 6. *Acanella dispar* USNM 56816: Distal branches with twigs in whorls. Stereoscopic pairs. Scale bars = 1 cm.

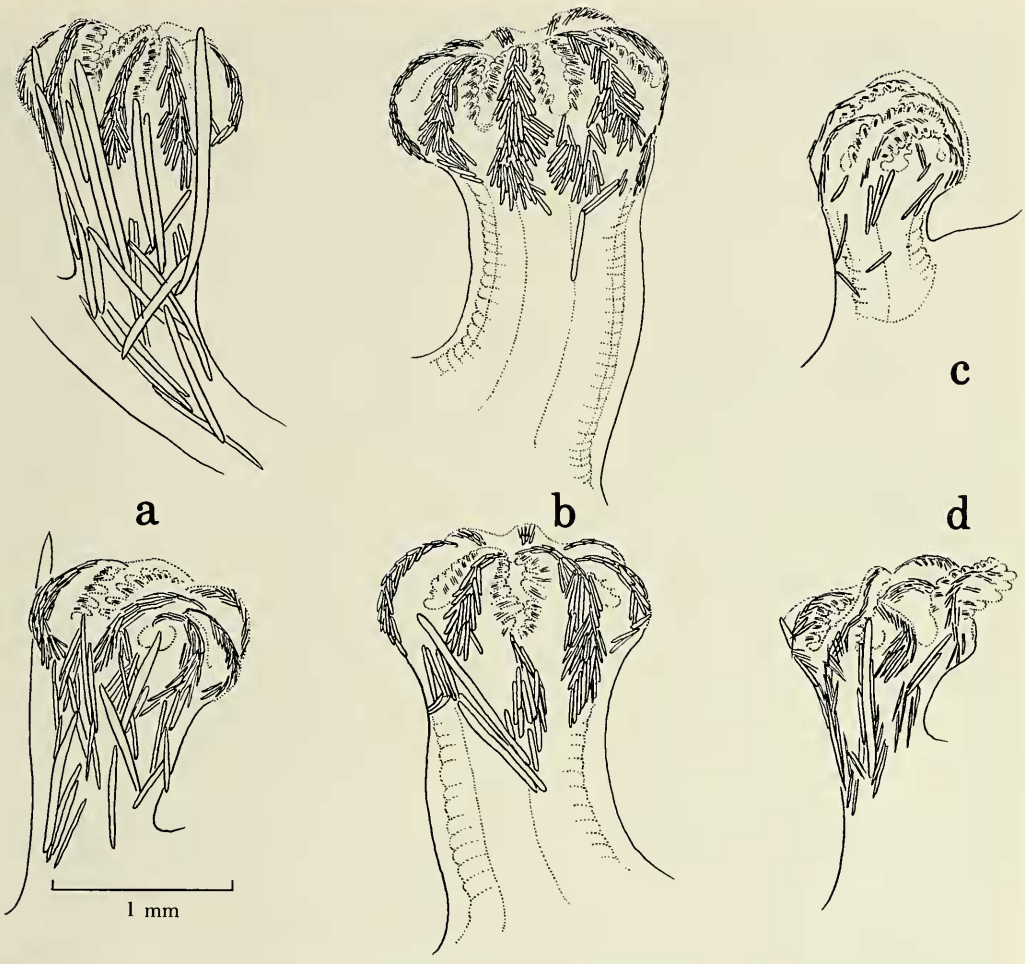
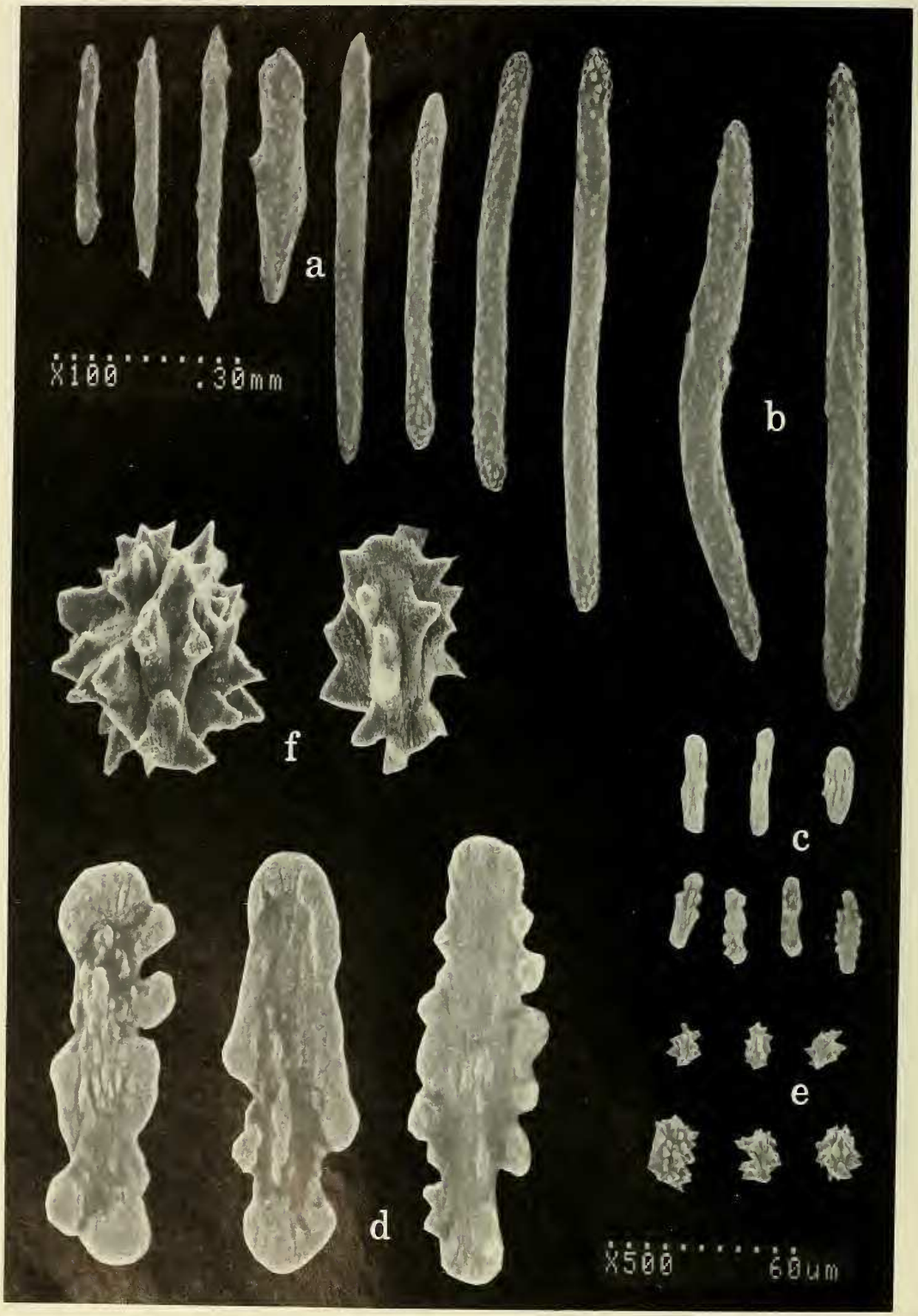


Fig. 7. *Acanella dispar,* polyps: a, b, USNM 56816. c, 56719. d, 56726.

10 cm of the main trunk is thickened by irregular massive deposits of internodal material that obscure many of the nodes and form a strong basal support about 2 cm in diameter.

The polyps are closely crowded on the smaller branches and twigs, concentrated on the two sides in the plane of branching but not in a strict biserial arrangement; on the major branches they are more distantly placed, commonly 4 mm apart or even more. They are cylindrical, weakly curved and directed more or less distally, somewhat wider apically across the bases of the infolded tentacles, about 2.25 mm tall and 1 mm in diameter, 1.5 mm across the bases of the tentacles.

Spiculation of the polyps varies with respect to size and number but the arrangement is generally consistent. Clusters of small needles lie along the mesenterial insertions, converging toward the margin of the tentacular crown (Fig. 8a); a few of the needles in one or more rows, sometimes only on the abaxial side, sometimes all around, are much larger than the rest (Fig. 8b). These project little, if at all, in some polyps, but in others one or more needles


a
X100 .30mm
b
f
c
e
d
X500 60um

may project conspicuously. Interseptal groups of small needles converge toward the base of each tentacle, extending upward along the rachis more or less longitudinally or obliquely; groups of much smaller rodlets extend into the pinnules (Fig. 8c, d). The walls of the pharynx contain numerous thorny [6-radiate?] stars (Fig. 8e, f), mostly about 0.06 mm long, but a few may reach 0.12 mm. The large needles of the polyps are about 1 mm long, the smaller ones about 0.5 mm.

The internodes are snow white, the distal nodes brown, the proximal ones nearly black; in the alcoholic material the polyps are light brown to dark brown, depending upon conditions of preservation; upon drying the soft tissue becomes dark brown, almost black.

Etymology.—Latin *dispar* = different.

Comparisons.—This is the only species of *Acanella* known so far that inhabits hard bottom and develops a stout trunk. It is also unique in its planar primary branching that in the smaller branches becomes bushy, forming a flattened colony with side branches of typical *Acanella* aspect. Its polyps are smaller and less strongly armed than in any species heretofore recorded. This combination of characters may eventually require generic reallocation of *A. dispar.*

Remarks.—It is probable, but not certain, that the fragments from Hawaii reported by Nutting (1908) as the western Atlantic *Lepidisis longiflora* Verrill are this species.

Orstomisis, new genus

Diagnosis.—Isididae dichotomously branched from the nodes, predominantly in one plane, forming compressed, multiplanar flabellate colonies; internodes solid, short (up to 10 mm), often strongly curved, not longitudinally grooved; base of main stem developed as a massive calcareous trunk attached to solid substrate. Polyps forming prominent, cylindrical verrucae invested by thick, skinlike epithelium into which tentacles can be retracted completely; calycular rods not projecting beyond the bases of the infolded tentacles; walls of pharynx with small, sparsely tuberculate rodlets.

Type species.—*Orstomisis crosnieri,* new species, here designated.

Etymology.—From the acronym "ORSTOM" for Office de la Recherche Scientifique et Technique Outre-Mer, now known as the Institut Français de Recherche pour le Développement en Coopération, the agency responsible for collection of the material here described.

Orstomisis crosnieri, new species
Figs. 9–14

Material examined.—South of New Caledonia: 22°59.5'S, 167°22'E, 542 m; N/O *Vauban,* ORSTOM, Georges Bargibant coll., 7 Feb 1986. HGP-49. One damaged, incomplete colony, USNM 78372 (syntype).

South of New Caledonia: 22°59'5S, 167°22'0E, 490–515 m, N/O *Vauban* sta. CP-216, 29 Sep 1985. Two colonies, MNHN Paris (syntypes).

Southeast of New Caledonia: 23°05'792S, 167°46'544E, 600 m, N/O *Jean Charcot,* ORSTOM, sta. CP-52, 31 Aug 1985. Two colonies MNHN Paris (syntypes), one USNM 84774 (syntype).

Loyalty Islands: 20°35'078S, 166°53' 990E, 460 m, N/O *Jean Charcot* sta. DW-83, 6 Sep 1985. One colony MNHN Paris (syntype).

Diagnosis.—As for the genus.

Description.—The colonies (Figs. 9, 10a) are 20–45 cm in height, mostly not as wide as high but in two cases approximately so.

←

Fig. 8. *Acanella dispar* USNM 56816, sclerites: a, Small needles of body wall. b, Large needles of body wall. c, d, Flat rodlets from pinnules. e, f, Thorny stars from pharynx. a–c, e, 0.3 mm scale; d, f, 60 μm scale.

The main stem of all specimens forms a massive calcareous trunk (Fig. 10a), broken from the substrate so the holdfast proper is unknown. In the lower parts of the trunk, the thickening internodes grow over the nodes, ultimately obliterating all external evidence of their presence. Several primary branches arise from the main stem, subsequently branching from the nodes mostly in one plane from which the terminal twigs irregularly diverge; the resulting colonies consist of several roughly parallel planes forming a compressed, complex, multiplanar flabellum. Branching typically is dichotomous, two branches arising from a node at 90°–180°; the widely diverging branches usually curve upward producing conspicuously lyre-shaped bifucations (Fig. 10b).

The distal and intermediate internodes (Fig. 10c) are round in cross-section, not longitudinally grooved, the surface weakly granular and crowded with desmocyte pits clearly visible by SEM at low magnification; at higher power, vestiges of pits in various stages of infilling are abundant along with sharply defined pits where the desmocytes presumably were still functional at the time of collection (Fig. 10d). At the apex of the distalmost internodes the tubercles are more prominent and closely interspersed with desmocyte pits (Fig. 14). The thinnest internodes are only 0.5 mm in diameter. The lowermost internodes before the onset of secondary thickening are nearly straight, about 1 cm in diameter and 13–18 mm long, gradually decreasing in thickness distad where the narrower internodes are about 1 mm in diameter and 7–10 mm long.

On the larger branches, the nodes are very short, appearing as a dark brown line about 1 mm wide; those of the smaller branches may be up to 2.5 mm long. Although successive nodes may bifurcate, more commonly branches are separated by 2–4 unbranched internodes, i.e., they arise from every 3rd to 5th node. In some cases, three branches arise from a single node, one continuing the direction of the preceding internode, the others diverging to each side at about 90°; where three successive nodes produce two lateral and one axial branch a "pinnate" arrangement results. Rarely one node produces more than three branches, but this does not occur regularly to produce a bushy colony as in *Acanella.*

The polyps are cylindrical, about 0.9–1.3 mm in diameter and 1.5–2.0 mm tall, depending upon the degree of contraction (Fig. 11b). In contraction the tentacles are folded over the mouth and are withdrawn into the verrucal aperture. The verrucal margin may be closed more or less completely over the retracted tentacles. When undamaged, the verrucae are covered by a smooth, thick epithelium through which rodlike sclerites can be seen faintly or not at all. They have eight more or less distinct longitudinal furrows that distally divide the verrucal margin into low, rounded lobes. The smooth epithelium also covers the coenenchyme, in some places with faint longitudinal grooves following the course of the stem canals. Terminal branchlets may have two polyps opposed at the apex and the older polyps may be arranged approximately in pairs, but they become more or less widely separated by unequal growth of intervening coenenchyme on the more proximal internodes, where they are scattered on all sides. Cylindrical rods (Figs. 12a, 13a) reaching about 1 mm in length and 0.1 mm in diameter are placed longitudinally or diagonally in the verrucal wall, with smaller rods interspersed among them. The rachis of the tentacles contains smaller rods, decreasing in size in the pinnules (Figs. 12b, 13b). Twinned rods in the shape of crosses are not uncommon (Figs. 12a, 13a). The pharyngeal wall contains small, sparsely knobby or thorny rodlets of basically 8-radiate form (Fig. 12c).

The coenenchyme between the polyps is practically devoid of sclerites, although a few somewhat flattened rods occur widely

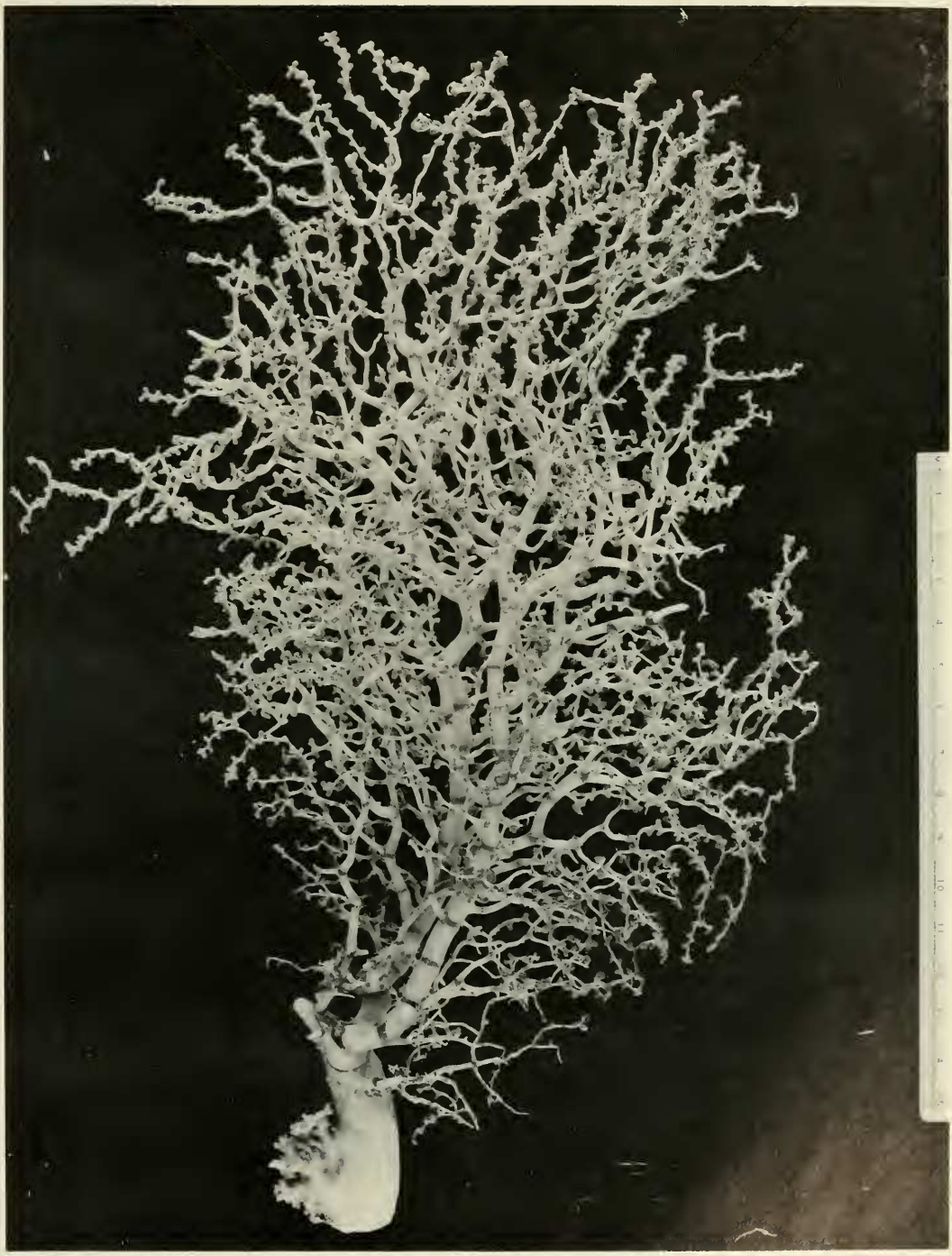


Fig. 9. *Orstomisis crosnieri* USNM 84774: syntype colony.

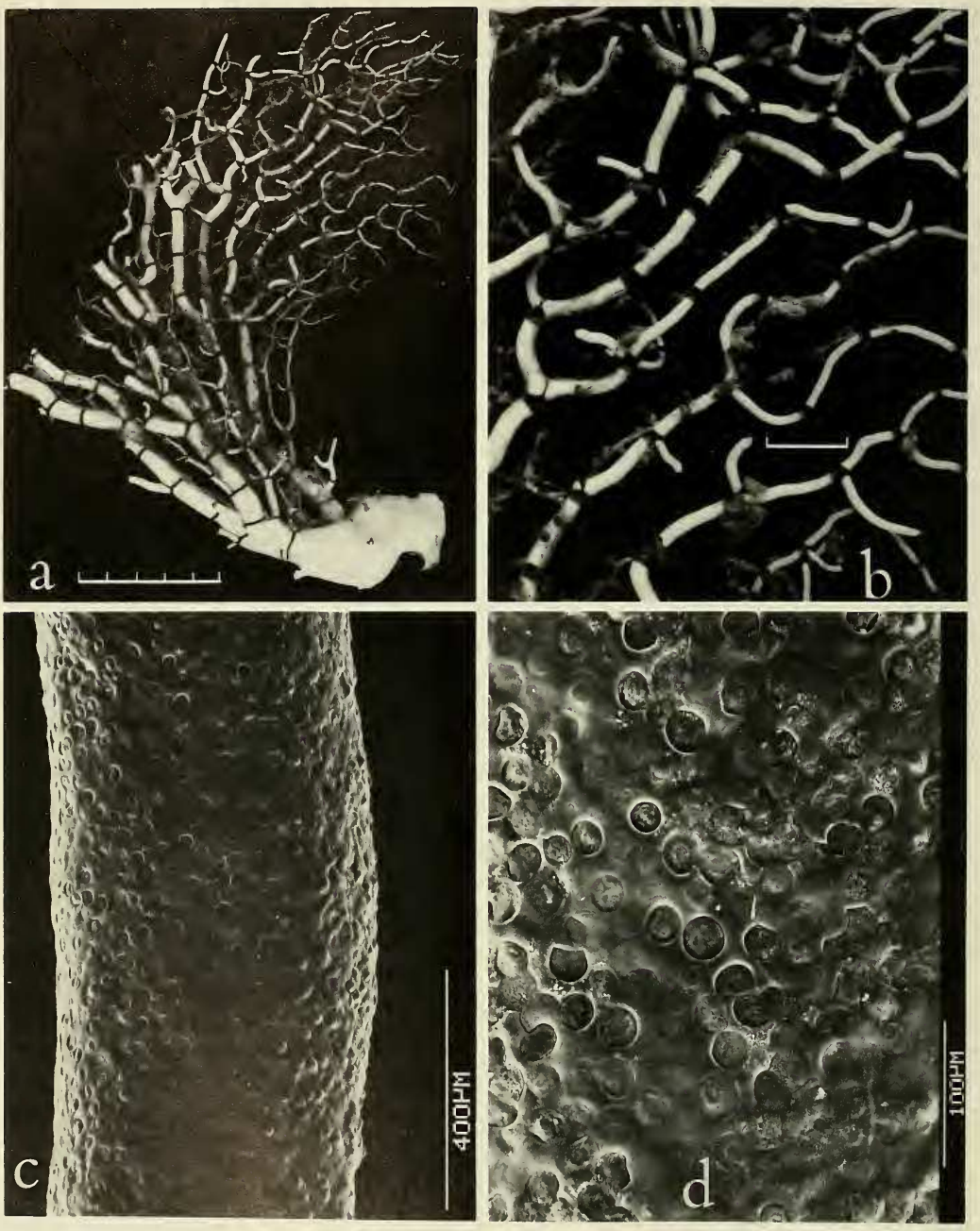


Fig. 10. *Orstomisis crosnieri* USNM 78372: a, Colony severely decorticated. b, Detail of branches. c, Part of axial internode. d, Surface of axial internode. Scale at a = 5 cm; b = 1 cm.

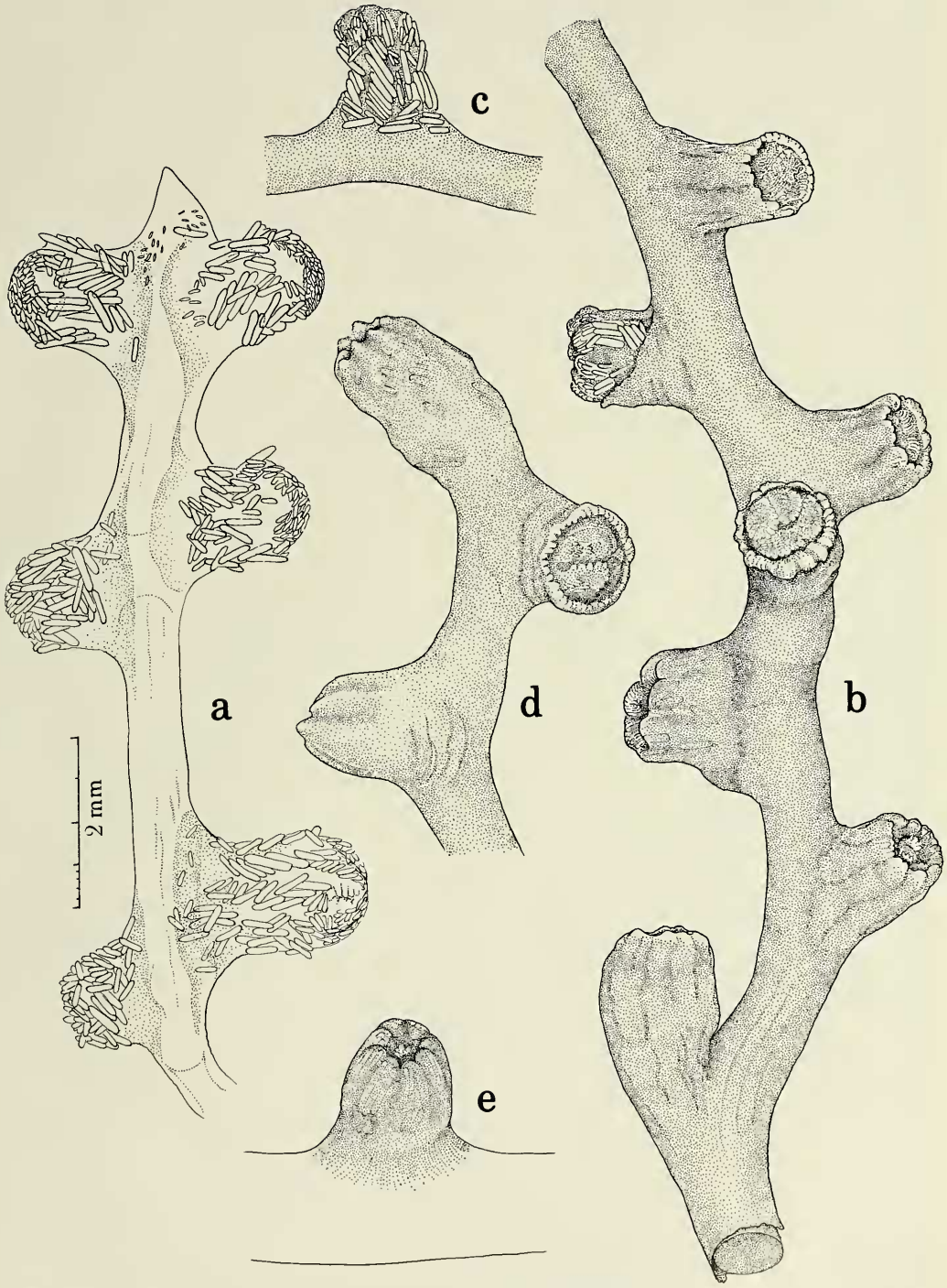


Fig. 11. *Orstomisis crosnieri,* terminal branchlets. a, USNM 78372, with verrucae flayed. b–e, USNM 84774: with verrucae intact or partly flayed.

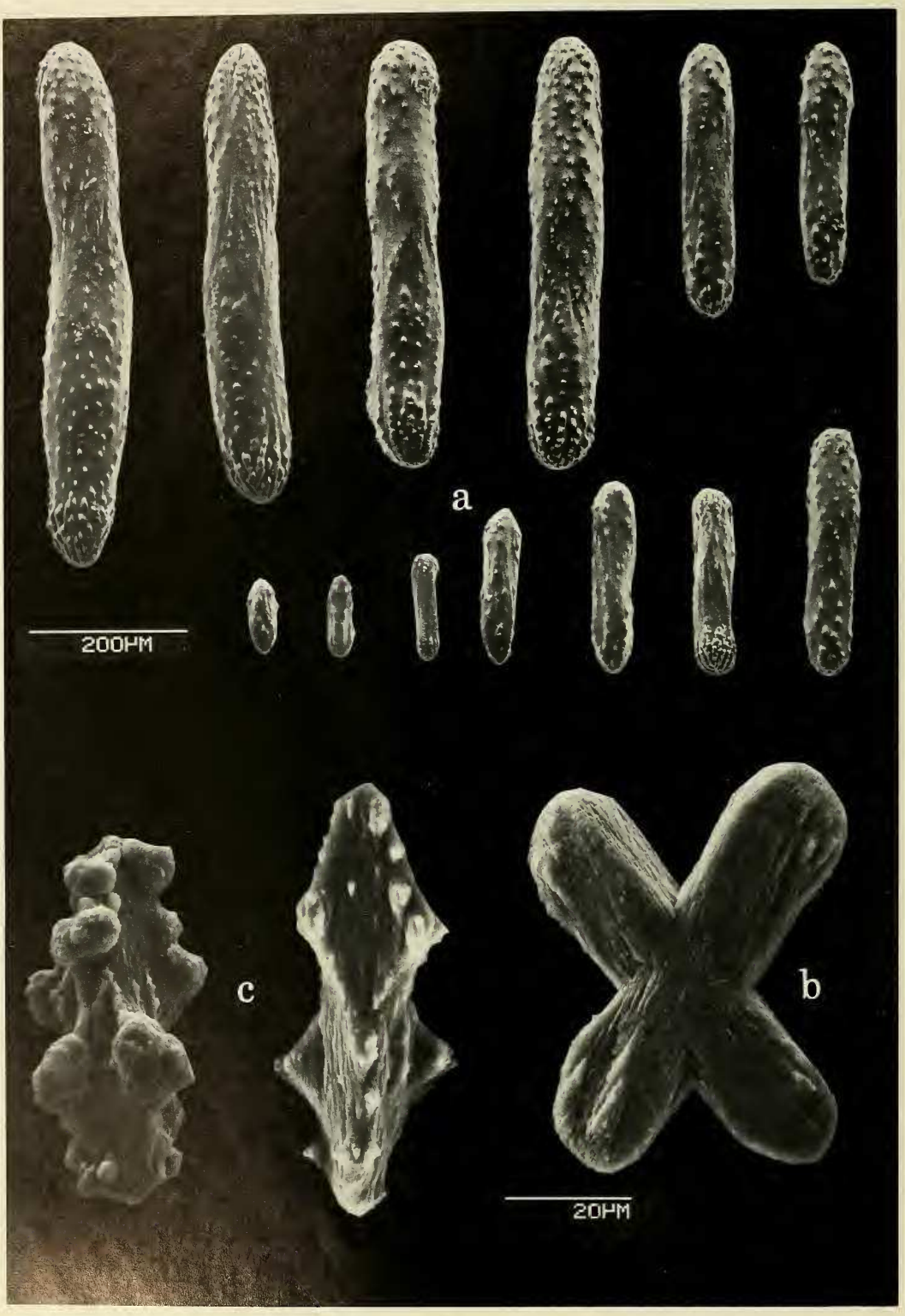


Fig. 12. *Orstomisis crosnieri* USNM 78372, sclerites: a, Rods of verrucae. b, Twinned rodlet. c, Pharyngeal rods. a, 200 μm scale; b, c, 20 μm scale.

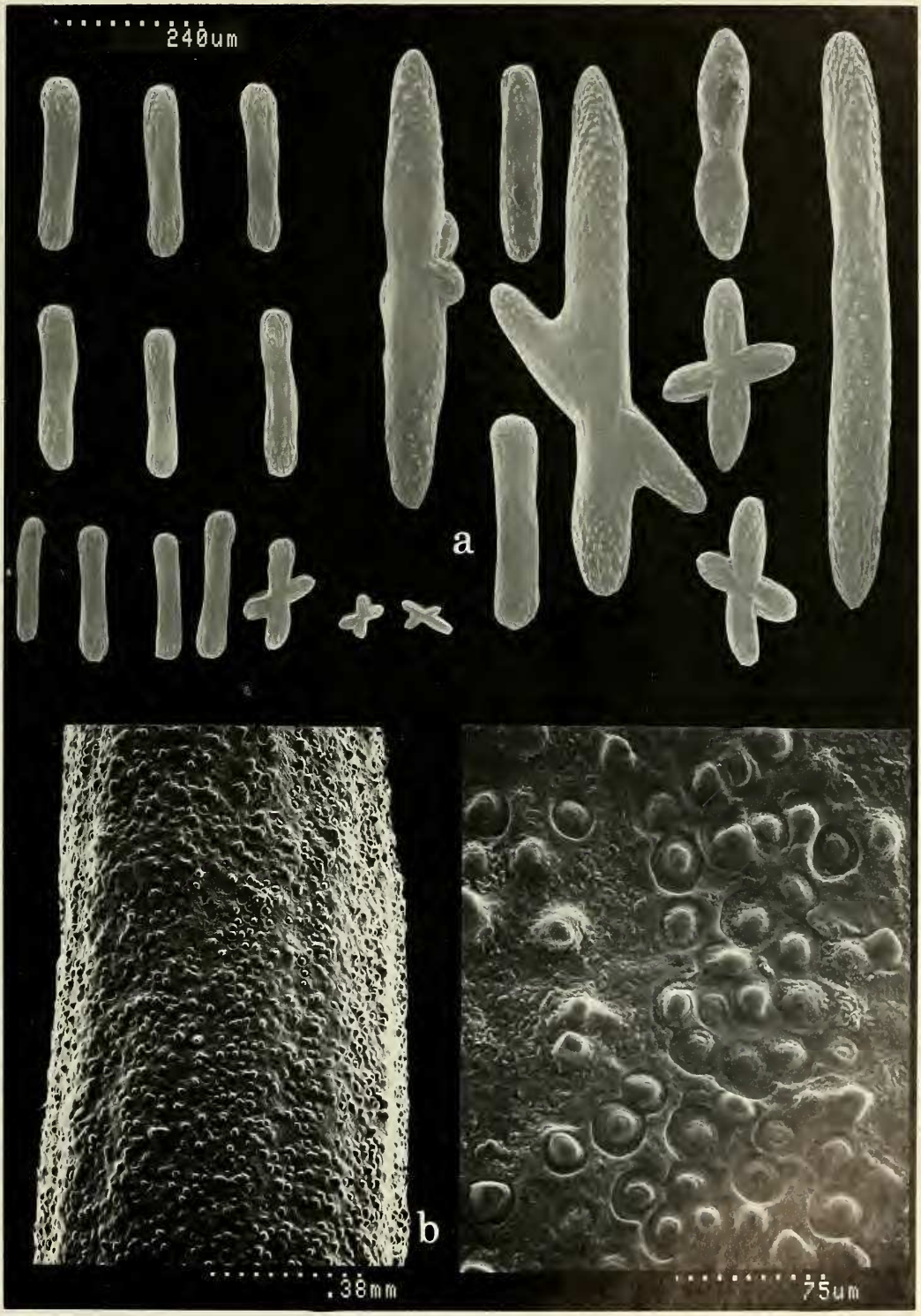


Fig. 13. *Orstomisis crosnieri* USNM 84774: a, Verrucal sclerites. b, Part of distal internode. c, Surface of distal internode.

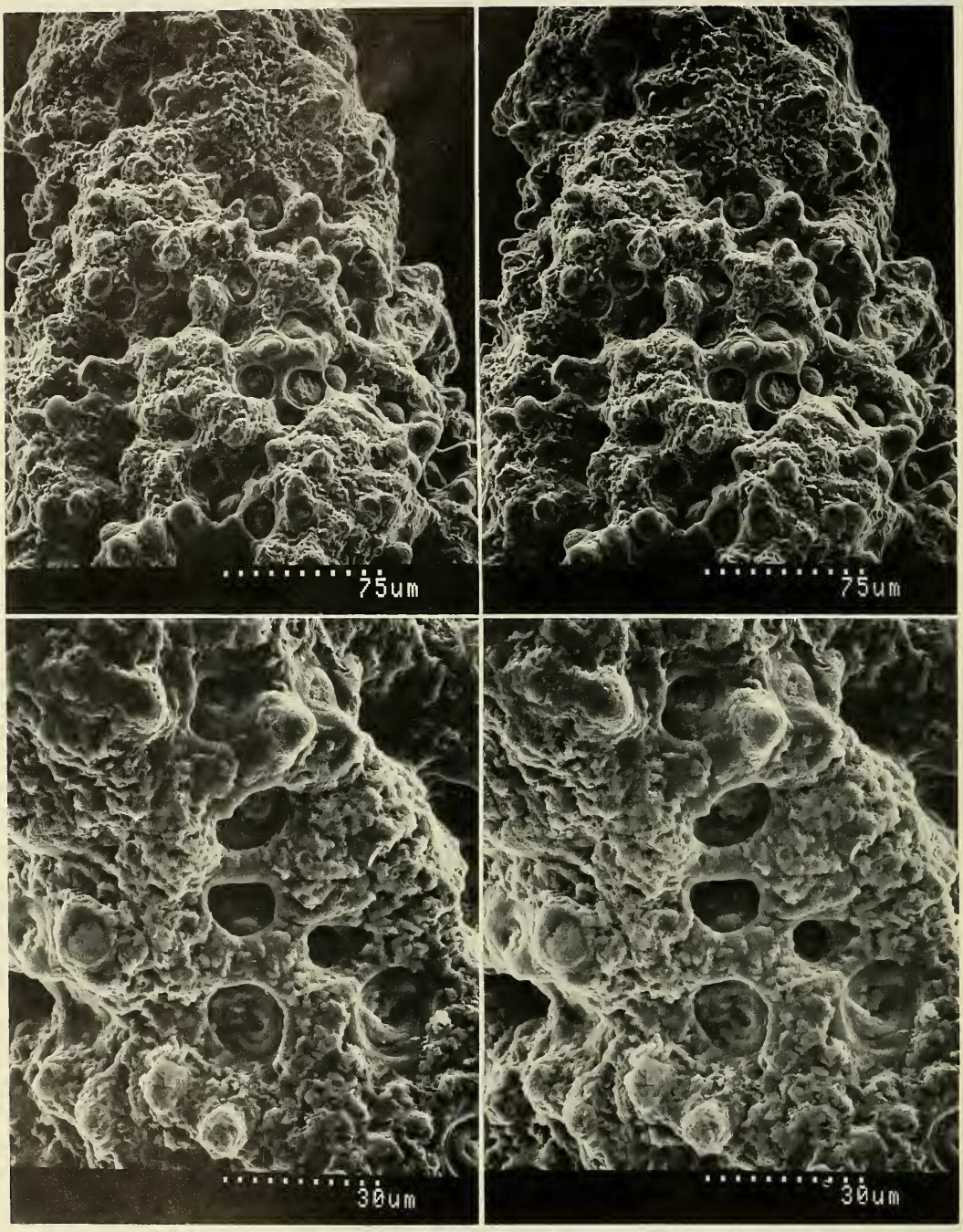


Fig. 14. *Orstomisis crosnieri* USNM 84774: Surface of distal internode immediately below tip. Stereoscopic pairs.

scattered, especially in the vicinity of polyps. Brownish pigmented streaks, usually discontinuous, mark the course of the stem canals.

Remarks.—Although thick, the smooth, skinlike epithelium seems to be very delicate, as it had been completely stripped off the first specimen received. This exposed the rod-shaped sclerites of the verrucae (Fig. 11a) and obscured the fact that the tentacles can be folded within a fleshy verrucal margin (Fig. 11b), leading to provisional classification of the specimen as a species of *Isidella* on the basis of its branching from the horny nodes, in spite of some morphological discrepancies. Specimens in better condition received later immediately revealed the unique nature of the verrucae (Fig. 11b–e), necessitating the establishment of a new genus.

This new genus cannot be accommodated in either of the subfamilies Isidinae and Muricellisidinae established by Kükenthal on the basis of retractability of the polyps. It provides evidence that retractability alone is an insufficient basis for subfamilial distinction. Among the Isididae, *Isis, Chelidonisis,* and *Muricellisis* are the only genera having non-scalelike sclerites with tubercular ornamentation; that they are "retractile" can only be regarded as coincidental, as the polyps of each retract in different ways. The polyps of *Isis* are virtually devoid of sclerites and retract into a thick coenenchyme by folding the tentacles over the mouth and closing the rim of the coenenchymal aperture. The polyps of *Chelidonisis* have blunt, conical or hemispherical verrucae filled with sclerites that extend onto the tentacles, which merely fold inward during contraction, and therefore are not "retractile" in the same sense. The polyps of *Muricellisis* are divided into a proximal, projecting anthostelar part into which the distal, anthocodial part armed with sclerites arranged as a crown and points can retract more or less completely—at least theoretically. The only character shared by these three genera is the tubercular ornamentation of the sclerites: capstans, clubs and spindles in *Isis,* sexradiates in *Chelidonisis,* and sharp spindles in *Muricellisis.*

Orstomisis, undeniably "retractile," does not share this spicular character. Its sclerites are definitely rods of the *Keratoisis* type. It does not clearly fit into either Isidinae or Muricellisidinae, but it does not justify still another subfamily. A solution to the subfamily problem is to define the Isidinae on the basis of tubercular ornamentation of sclerites, not retractability, and merge Muricellisidinae with it. Then Keratoisidinae can be defined on the basis of sparsely prickly or thorny rod-shaped sclerites, with *Orstomisis* the only genus with retractile polyps.

Etymology.—Dedicated to Dr. Alain Crosnier, in recognition of his tireless efforts to obtain financial support for a comprehensive study of the rich collection of Octocorallia obtained by expeditions of ORSTOM.

Comparisons.—This species is unlike any isidid heretofore described. The retractability of the tentacular part of the polyps into a firm, proximal calyx is unique in the Keratoisidinae and is paralleled only in *Muricellisis* in the Isidinae (Muricellisidinae of Kükenthal). The truly dichotomous manner of brancing predominant in this species occurs elsewhere only in *Chelidonisis* (Isidinae).

Acknowledgments

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